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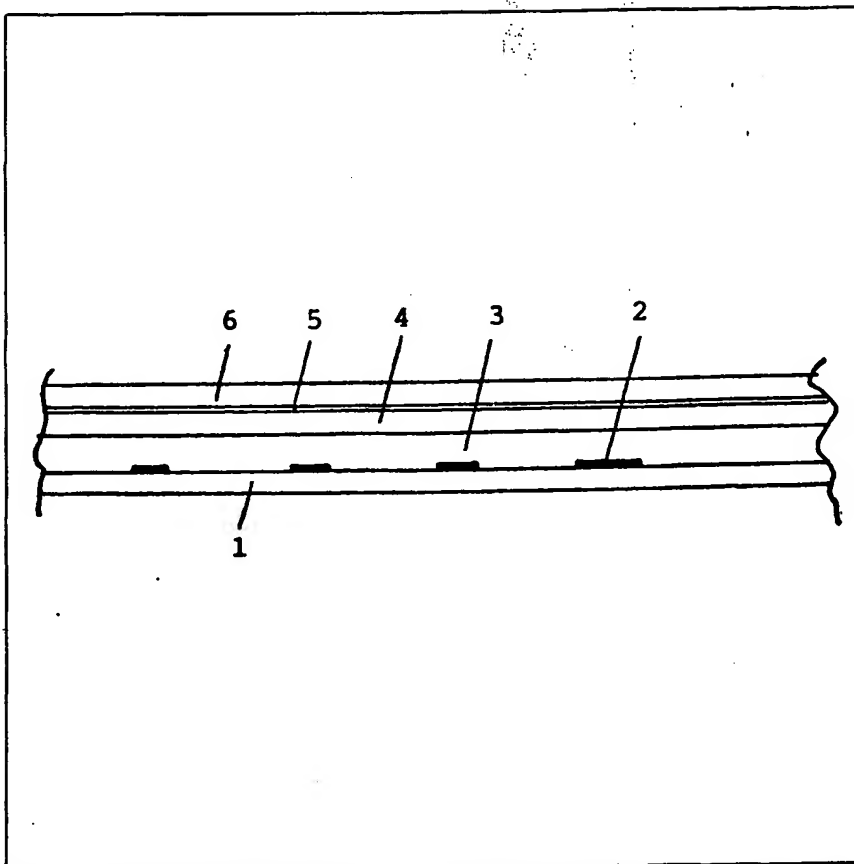
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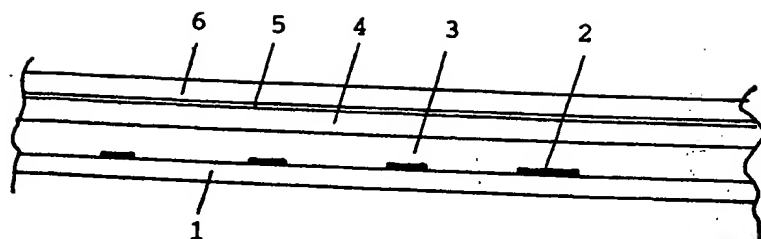
## (54) Heat transfer printing

(57) A laminated transfer sheet comprises a paper backing sheet 1 printed with a sublimible transfer ink 2, a polyester film 4 over the printed surface of the backing sheet and heat-sensitive adhesive 6 over the polyester film. The bond between the paper backing sheet 1 and the polyester film 4 is provided by an adhesive 3 which under heat transfer printing conditions is pervious to the sublimible transfer ink and releases its bond between the backing sheet and the film. Thus when heat and pressure are applied to the unprinted exposed side of the paper backing sheet, the heat sublimible transfer ink sublimes to form an image on the polyester film; the film is released from its backing sheet; and the heat-sensitive adhesive 6 is activated to adhere the

film to a substrate over which it is placed. This substrate may be made receptive to the sublimible ink by the film.



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## SPECIFICATION

## Heat transfer printing

## 5 DESCRIPTION

The invention relates to the art of transfer printing and provides a novel transfer sheet for printing onto virtually any surface. The transfer sheet can be flat, for producing individual prints, or in roll form for continuous production.

To produce a transfer print by heat transfer processing sublimible dyes it is necessary to place a printed heat transfer sheet over the surface to be printed and to apply heat to the back of the heat transfer sheet. The sublimible dyes with which the transfer sheet is printed are transferred to the substrate surface to form the final print. The substrate must therefore be capable of accepting those dyes, and the transfer sheet and substrate must be held together in close contact during printing to ensure that a crisp clean print is obtained.

It is known that polyester film is a suitable medium for accepting a transfer print by such a heat transfer process. It has been proposed to adhere the film to a surface to be printed, prior to printing, to improve the permanence of the final print and to provide a shiny image. The polyester film is, however, difficult to handle and must be adhered to the substrate as a separate step. The process is therefore generally uneconomical.

The invention provides a laminated transfer sheet comprising a paper backing sheet printed with a sublimible transfer ink, a polyester film over the printed surface of the backing sheet and a heat-sensitive adhesive over the polyester film, wherein the film is adhered to the backing sheet by an adhesive which under heat transfer printing conditions is pervious to the sublimible transfer ink and releases its bond between the backing sheet and the film.

When transfer printing using a transfer sheet according to the invention the transfer sheet is placed face down on the substrate, and, heat and preferably pressure applied to the exposed (unprinted) side of the paper backing sheet. This has the triple result that the heat-sublimible transfer ink sublimates and passes through the adhesive onto or into the polyester film; that the adhesive bond between the paper backing sheet and the film is broken to release the film from its backing sheet; and that the heat-sensitive adhesive is activated to adhere the film to the substrate. The above three results do not necessarily occur in that order, but the overall result is that the substrate has adhered thereon a printed film of polyester. The film gives the printed image a shiny appearance which can be very attractive, and furthermore can be adhered to any of a wide variety of substrates including those which by themselves would

not have accepted the dyes of the transfer ink. By suitable selection of transfer ink dyes and polyester film it is possible to ensure that the dyes penetrate the film to an appreciable

extent during the transfer process so that the printed image is not merely a surface image.

If desired the polyester film may be opaque so that the printed image formed thereon stands on an opaque background, thus obviating the need for scuring the substrate itself which may for example be patterned. If such a result is desired it is preferable for the transfer sheet to be prepared by printing the opaque ground on the film surface remote from that which is adhered to the backing sheet, and coating the printed surface with the heat-sensitive adhesive. This ensures that the dyes of the transfer ink do not have to pass through the opaque ground before they are accepted on the film, and no dilution of the resulting images results.

The criteria which govern the choice of adhesive bonding the film to the paper backing sheet are that it must be pervious to the sublimible dyes of the transfer inks, under the intended heat transfer conditions; that after the heat transfer process there should not be a sticky adhesive film on the polyester; and if clear images are to be printed on the paper backing sheet that it should not be a solvent for the heat transfer dyes. The second of these criteria can be met by using an adhesive which is retained by the paper after the transfer process, or by using one that is broken down by the heat of the transfer process into non-stick and preferably non-oily components. The following adhesives have been found to satisfy all three requirements:

- TUFSKIN 5742/12; the trade name of a polyvinyl acetate emulsion adhesive marketed by Alfred Adams & Co. Ltd.,
- CRODAFIX 28-19000; the trade name of a polyvinyl acetate emulsion adhesive marketed by Croda Adhesives Ltd.,
- X 1084; the trade name of a solvent-based acrylic copolymer adhesive marketed by Berger Adhesives Ltd.
- 3M's 75; the trade name of an aerosol pressure-sensitive adhesive marketed by the 3M's Co. Ltd.

The transfer sheets of the invention may be used to print onto a wide variety of substrates such as textiles (including cotton which does not readily accept many sublimible dyes), films, foils, metal surfaces, glass and wood. Especially for use on textiles. The sheets are preferably cut into small motif-sized pieces before use so that the shiny appearance of the film is confined to the general area of the printed image.

## DRAWING

The drawing shows, on an exaggerated scale, a section through a transfer sheet according to the invention. A paper backing

- sheet 1 has printed thereon an image 2 from inks which comprise sublimible dyestuffs. An adhesive 3 coats the printed sheet 1 and secures in place a polyester film 4 such as a
- 5 MELANEX or similar film ("MELANEX" is a Trade Mark of ICI Ltd). The surface of the film 4 remote from the paper backing 1 is printed with a solid ground of a white or coloured ink 5 (although this is an optional feature that
- 10 may be omitted) and finally there is a coating 6 of a heat-sensitive adhesive.

- On application of heat and pressure as in a transfer printing process the dyestuffs of the image 2 sublime through the adhesive 3 onto
- 15 or into the film 4; the adhesive bond of the adhesive 3 is broken thereby releasing the film 4 from the backing paper 1; and the heat sensitive adhesive of coating 6 bonds the film 4 to the substrate.

20 CLAIMS

1. A laminated transfer sheet comprising a paper backing sheet printed with a sublimible transfer ink, a polyester film over the printed
- 25 surface of the backing sheet and a heat-sensitive adhesive over the polyester film, wherein the film is adhered to the backing sheet by an adhesive which under heat transfer printing conditions is pervious to the sublimible transfer ink and releases its bond between the backing sheet and the film.

2. A laminated transfer sheet according to claim 1, wherein the polyester film is opaque.

3. A laminated transfer sheet according to
- 35 claim 2, wherein the polyester film comprises an opaque ground printed on the film surface remote from that which is adhered to the backing sheet.

4. A laminated transfer sheet substantially
- 40 as described herein with reference to the drawing.

5. A process of printing using a laminated transfer sheet according to any preceding claim, wherein the transfer sheet is placed
- 45 face down on a substrate and heat and preferably pressure is applied to the unprinted exposed side of the paper backing sheet to cause the heat sublimible transfer to sublime and pass through the adhesive onto or into
- 50 the polyester film, to cause the adhesive bond between the paper backing sheet and the film to be broken to release the film from its backing sheet, and to cause the heat-sensitive adhesive to adhere the film to the substrate.